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# Web Based Information System for Job Training Activities Using Personal Extreme Programming (PXP)

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**Abstract.** Job training is one of the subjects in university or polytechnic that involves many users and reporting activities. Time and distance became problems for users to reporting and to do obligations tasks during job training due to the location where the job training took place. This research tried to develop a web based information system of job training to overcome the problems. This system was developed using Personal Extreme Programming (PXP). PXP is one of the agile methods is combination of Extreme Programming (XP) and Personal Software Process (PSP). The information system that has developed and tested which are 24% of users are strongly agree, 74% are agree, 1% disagree and 0% strongly disagree about system functionality.

## 1. Introduction

Job training is one of the subjects for university or polytechnic's students. Job training process involves three parties that are students, supervising lecturers and coordinator and consists of many activities reporting tasks. Sometimes they had difficulties and problems to do many activities and reporting task. This is caused by the distance and time and also manual reporting process during the job training. A web based information system of job training is the solution to overcome the problems. There are two approaches methodology in information system or software development, well-documented traditional heavyweight methodology and lightweight or agile methodology. Agile methodology introduced in the earlier 2001. The agile movement officially began with the creation of the agile manifesto. This manifesto was written and signed by seventeen lightweight methodologists. Agile methods are growing very rapidly. Agile methods are rapidly replacing traditional methods. A brief research about adoption of agile methods are conducted by Laanti [1]. They run a survey of opinion of agile transformation and most respondents are claimed the benefits of agile methods. Many comparative studies between agile methods and traditional methods was conducted, agile methods was developed to provide customer satisfaction, to shorten the development life cycle, to reduce bug rates and to accommodate changing business requirement during development [2]. There are agile methods are emerged, such SCRUM and eXtreme Programming (XP). SCRUM methodology was initiated by Schwaber in 1995. SCRUM has been used with the objective of simplifying project control through simple processes. It focuses on project management in situation where is difficult to plan ahead, with importance on feedback mechanisms [3]. While XP is a lightweight, based on addressing constraint in software development and can work with teams in any size [4]. Another research about agile methods was conducted by Rajagopalan [5]. The research gave brief information about almost all agile methods on vendor perspective.



XP has been widely used and most popular for software development methods. A detail study of software development with XP was conducted by Kumar [6]. The research explained the differences between traditional software development methods and the agile.

As the popular one XP methods was extended for particular purpose by doing a combination with other methods i. e Personal Software Process (PSP). PSP is a method that provided a disciplined personal framework for doing software work [7]. PSP is designed for with any programming language and design methodology. The PSP has been effective in helping engineers to achieved the zero defect product on schedule and within planned cost [8].

Related research about XP and PSP has been done by several researcher Agarwal was developed a new method based on XP combined with PSP [9], they focused on XP practices for a single person programmer instead a pair programmers. Dzhurov was created a new frame work of Personal Extreme Programming (PXP) [10]. Iqbal has modified XP by inserting in Personal Software Process which is easy to follow and keep the software development process lighten [11]. All research combined the Personal Software Process and XP method. PXP by Agarwal and Iqbal have some focuses in common. They used twelve XP practices to fit in single programmer. On the other hand PXP by Dzhurov created PXP framework. That consist of six of PXP practices are preserved from PSP. PXP aims to reducing the number scripts being followed and the amount of data to be filled in the form. PXP introduced a subset of the XP development practices which are appropriated to be performed by autonomous programmer or developer. PXP offered a new framework to develop software or an information system.

Web based information systems lately had growth rapidly, caused by ease and their flexibility any time and any where. There for we developed a web based information system that can be accessed any time and any where to manage the data and administration goods and provided features for job training activities. The software development methods we used PXP by Dzhurov, because it's benefits. The web based information system eventually can help coordinator, students and supervisor lecturers to do their job easily.

## 2. Methodology

An information system must provided features or tools correctly and helped user to do their job fast and easily. This research aims to develop an information system to manage job training and to provided features for the students and supervisor lecture during the job training's time using PXP by Dzhurov. This method chosen because its efficient developments practices of Extreme Programming in other to support better project planning and product quality control and can be used by autonomous developers. PXP process phase is shown in figure 1.

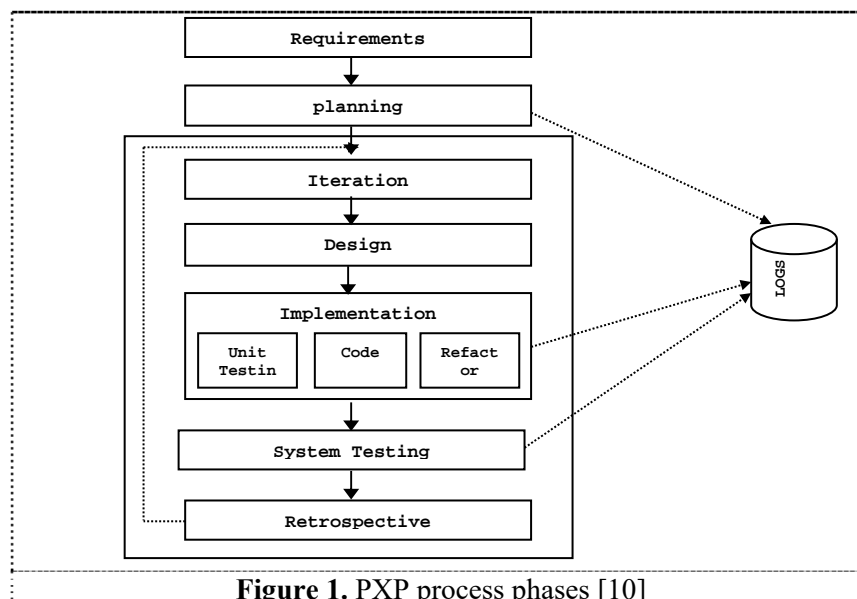


Figure 1. PXP process phases [10]

### 2.1. Requirements and Planning

Requirements phase in this research is done by spreading questionnaire to students and lecturers that are involved job training process. After the recapitulation process, we created a user story and estimated the times (days) need for developing each user story.

### 2.2. Iteration Initialization and Design

According to Dzhurov the iteration initialization indicates the beginning of each iteration. The iteration length could vary from 1 – 3 weeks depending on project scope. Design phase are where the developer created modules or classes to be implemented in the on going iteration.

### 2.3. Implementation

Implementation is where the actual code generation takes place. The application is develop using PHP and MYSQL 5.6. We are implementing all objects defined in the previous phase, and testing them. Implementation consist of three sub-phases; unit testing, code generation and refactoring.

### 2.4. System Testing and Retrospective

All features developed from the beginning are tested during system testing phase. In this phase we should verify whether the implemented solution meets the initial requirements. All found defect or error are fixed and recorded. The last phase is retrospective. All data from the previous phase analysed. The aim of this phase to mark the end of the project when whether all requirements have been determined and there are no defects or errors.

## 3. Results and Discussions

### 3.1 Requirements and Planning

They are 65 responders and the questionnaire consist of several questions that ask the responder about their activities during the job training, features should be provided by the application and ranked them with number 1 – 4 witch is number 1 representing the highest priority in creating the feature in application. The results as follows

**Table 1.** Features must be provided by application

Feature	Priority Score
Guidance	1,86
Reporting activities	2,09
Monitoring	2,12
Assessment	2,85

**Table 2.** Difficulties during job training process

Difficulty	Priority Score
Arrange guidance schedule	1,80
Get the guidance for the topic	2,00
Monitoring activities	2,10

Guidance has highest priority should be provided by the application and assessment feature is the lowest one. Based on the user responds the functional and non-functional for the system are created. Types of user are determined. There are three types of user, students, supervisor lecturer and job training coordinator. The system or the application divided into four modules according to the questionnaire's results. User stories created for each module. Writing the user story can use the formula “ *As a [role] I can [function] so that [rationale]* “. In other reference [12] “ *As a (role) I want*

(something) so that benefit)". A good user story writing should be independent, negotiable, valuable to users or customers, estimatable, small and testable [13]. Table 3 shows user story for guidance module.

**Table 3.** User stories of modules

Module	User	User Story
Guidance	Student	As a student I can get guidance from supervisor so that I can ask about the job training topics
	Supervisor Lecturer	As a supervisor lecturer I can give guidance to the student so that I can give advice to job training's students
	Coordinator	As coordinator I can assign a supervisor lecturer for the student so that I can make report of job training easily
Reporting Activities	Student	As a student I can report my daily activity so that my supervisor lecturer knows.
Monitoring	Supervisor lecturer	As a supervisor lecturer I can monitor the student activity so that I can know daily activity of the job training's student
Assessment	Supervisor lecturer	As a supervisor lecturer I can entering the assessment score so that I don't need to fulfil on the paper
	Coordinator	As a coordinator I can make the assessment report so that the reporting job training process more easily

Each story can be split into two or more small user stories [14]. This is to facilitate developer working on programming, with small user story easy to run unit test. During the planning phase, the major decisions are made. The story points or estimation times of each iteration is determined, and so does the iteration's velocity. Table 4 shows the iteration's times estimation.

**Table 4.** Time Estimation of Iterations

No	User Story (US) code	Description	Estimation (day)
Iteration 1			
1.	US 01	Login	3
2.	US 02	Edit and view profile	3
3.	US 04	Add guidance	2
4.	US 05	Send a question text	2
5.	US 06	Upload a file	2
6.	US 07	Send an answer text	2
			velocity 14
Iteration 2			
1.	US 08	Add activities	3
2.	US 09	Approve activities	2
3.	US 10	Add assessment score	5
4.	US 11	Edit assessment score	4
			velocity 14
Iteration 3			
1.	US 12	set supervisor lecturer	5
2.	US 13	Import data from excel	5
3.	US 14	Download the assessment score	2
4.	US 15	Download the guidance recapitulation	2
			velocity 14
Iteration 4			
1.	US 16	Download Job Training regulation	2
2.	US 17	Download Job Training report template.	2
3.	US 03	Change Password	2
			velocity 6

### 3.2 Iteration Initialization and Design

With the 48 story points and the iteration velocity is 14, so it needed 4 iterations to finish the 48 story points. During the design phase developer modelling the system, including database and user interface. Simpler design means less development time and it is cheaper replacing code when little time has been employed on it.

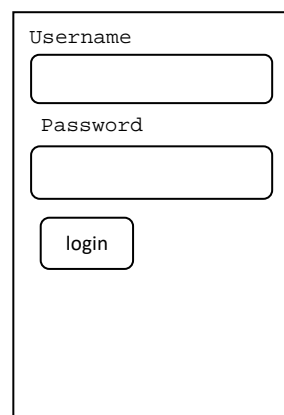
### 3.3 Implementation

The implementation phases began with the implementing user story with their TDD and Acceptance Test Driven Development (ATDD) named Acceptance Test Story. TDD rules are defined by Beck a very simple [15]. Acceptance tests are from the user's point of view-the external view of the system [16]. The overview of TDD Research project and experiment has been conducted by Bulajic [17]. This research ran ATDD for user stories. Table 5 shows the Acceptance Test Story for US 01 Login.

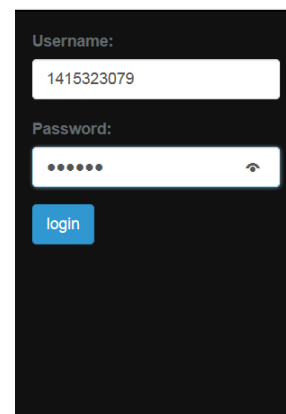
**Table 5.** Acceptance Test Story for US 01 Login

Acceptance Test Story US 01
1) Checking user's type
2) Validating username and password
3) Save user's data to database

When the implementing code passed the acceptance test criteria and the unit tests are performed, the next step is code development and refactoring. In the implementing phase all unit testing passed successfully and the code compiled without any error. Figure 2 shows login user interface and the implementing user interface login shown in figure 3.



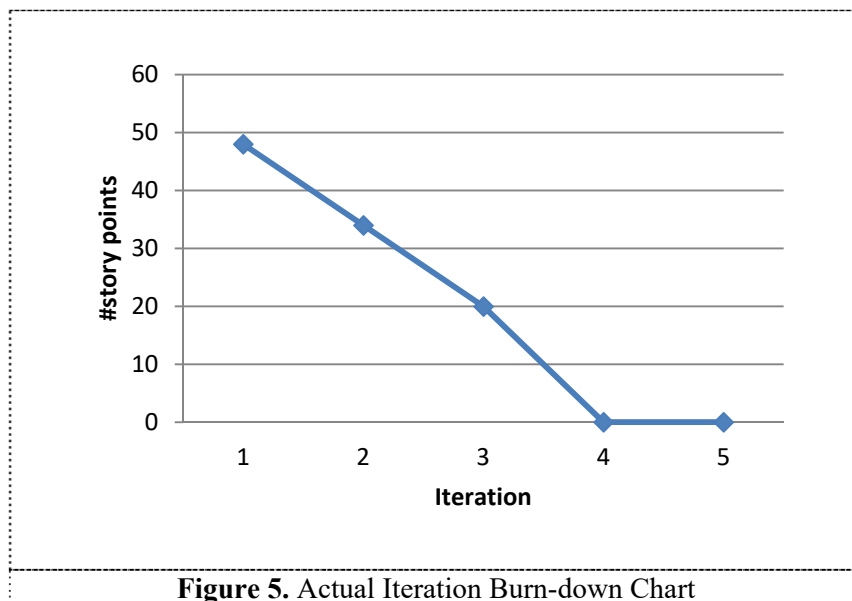
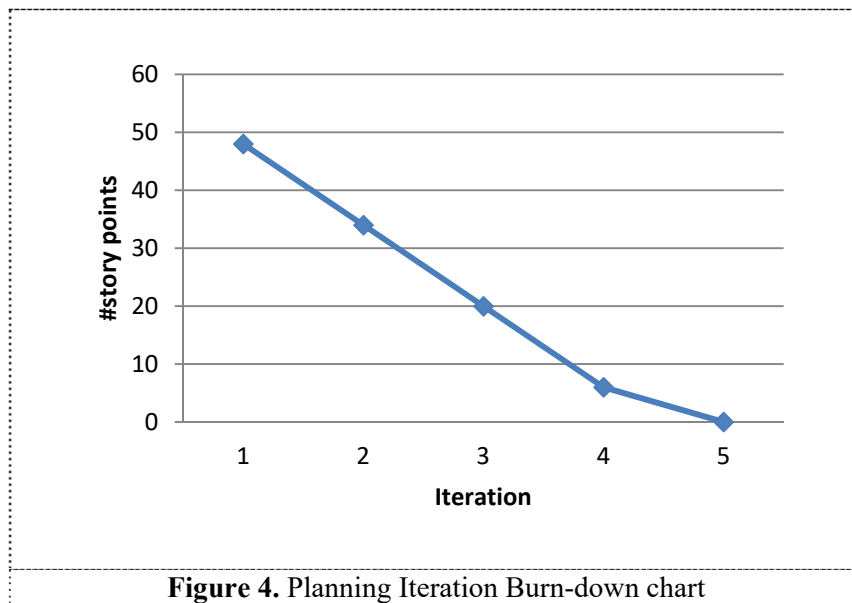
**Figure 2.** Login user interface



**Figure 3.** Implementing login user interface

### 3.4 Burn-down chart

A burn-down chart is used to understand and track the progress of development sprint or iteration. Burn-down chart also used to see how many works to do. The planning iteration burn-down chart are made from Table 3 with total 48 story point and 4 iterations. The velocity determined 14. The burn-down chart shows in figure 4. The actual iteration burn-down chart is shown in figure 5. Burn-down chart on this research follows the burn-down chart scheme in [18]. During the process development several user story are done faster than the time estimation. US 05 and US 7 on the Iteration 1, US 8 and US 11 from Iteration 2, US 12 and US 13 are one day faster than the time estimation. If the velocity is 14 than US 8 in Iteration 2 moved into the iteration 1, and so did the user story from Iteration 3. Overall actual development requires only 3 iterations.



### 3.5. Release

The information system is already launched for release and tested by 60 users (students and supervisor lectures and job training coordinator). We conducted a survey to find out whether the system met all the requirements or not. The action is important for bring feedback to developer. The user’s responses of the information system through several questions are shown in table 7. The questions are designed to collect and summary opinion about the performance of information system including the how fast the system can be accessed.



**Table 6.** User Responds

No.	Question	Agreed	Strongly Agreed	Disagreed	Strongly Disagreed
1.	Is the application very useful	30%	70%	0%	0%
2.	Is the application easy to use	30%	70%	0%	0%
3.	Is the application met the requirements	25%	75%	0%	0%
4.	Is the application has attractive design	12%	82%	7%	0%
5	Is the application fast accessed	25%	75%	0%	0%
Average		24%	74%	1%	0%

#### 4. Conclusion

The development web based job training information system using PXP has been successful and in a relatively short time. The information system met all requirements generated from questionnaire. The result of release in average are 24% of respondents are strongly agree, 74% are agree, 1% are disagree and 0% of respondents are strongly disagree. As we showed in table 7 there are only 1% of respondents said disagreed about question of attractive design, because the job training information system focused in easy and fast accessed the features. The applying PXP method has provided convenience to determining the duration of development cycle and facilitated the developer to build the code directed according to user stories. Time estimation on iteration planning burn-down chart is 48 days work, but the actually burn-down chart is 42 days work.

#### 5. Acknowledgements

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